

## **5 FIELD SAMPLING METHODS**

This section presents the field sampling methods to be used by Integral and its subcontractors for the assessment of the Park. Appendix A contains standard operating procedures (SOPs) for most field methods discussed in this section. In general, field and sample processing methods will follow the Ecology Sediment Sampling and Analysis Appendix and the Puget Sound Estuary Program (PSEP) guidelines for marine and freshwater sediments and surface waters (Ecology 2003, PSEP 1986, 1997a,b,c).

### **5.1 HORIZONTAL AND VERTICAL CONTROL METHODS**

#### **5.1.1 Utility Survey**

Proposed sampling locations within the Park will first be marked either by a handheld Global Positioning System (GPS) or contracted land surveyor. A clearly marked stake will be driven into each location. Prior to commencing intrusive field activities, Integral will conduct a utility survey to identify all known underground utilities within the study area. Integral will utilize all information provided by the City and Whatcom County as the baseline for the utilities survey, including the approximate location of the underground stormwater pipe located in the upper area of the park. Integral will also use the regional One-Call service (1-800-424-5555) for locating stations near Marine Drive. If proposed sample locations interfere with utilities, alternate locations will be marked.

#### **5.1.2 Sample Locations**

Once the utility survey has been completed, proposed sampling stations will be located by a contracted land surveyor (i.e., David Evans & Associates) using a Leica Electronic Distance Meter (EDM) Total Station positioning method. If it is necessary to move a station during the field work, the new location will be marked and staked as described above. At the conclusion of sampling, the land surveyors will survey changed station locations and provide x, y, and z data for all sampling locations. The boundaries of the shell midden and any other archaeological site within the Park will also be surveyed by DEA.

To maintain system accuracy, one or two accessible and recoverable survey control points will be established near or within the Park. Northing and easting coordinates will be provided in both NAD 27 and NAD 83 with 0.1-ft accuracy (City of Bellingham currently uses NAD 27 datum). After sampling is completed, using control points established by the land surveyor, the elevation of each sample point will be determined by differential leveling. Station elevations will be referenced to NAVD 88 and City of Bellingham coordinate system.

The following parameters will be documented at every sample location:

- Horizontal location in state plane coordinates NAD 1927 and 1983
- Depth to mudline (if overlying water)
- Time and date
- Surface elevation referenced to NAVD 88, 2001 Adjustment in U.S. Feet and City of Bellingham coordinate system.

Parameters listed above will be measured using combinations of the following:

- GPS Total Station
- Range-azimuth laser positioning methods
- Sounding lines or poles
- Back-up methods to survey control points (e.g., horizontal triangulation).

## **5.2 SAMPLING EQUIPMENT**

### **5.2.1 Test Pits**

Soil samples will be collected from test pits excavated using a backhoe to a depth of 4 ft bgs. SOP-1 presents the procedures planned for test pit excavations in the Park. Three of the test pits (TP-3, TP-6, TP-12) will be excavated deeper (~6 ft) for the installation of piezometers to monitor groundwater levels in the area (also described in SOP-1).

### **5.2.2 Hand Augers**

Soil samples will be collected using a stainless-steel hand auger or equivalent to a depth of 2 ft bgs. SOP-2 presents the procedures planned for sampling with a hand auger in the Park.

### **5.2.3 Groundwater Sampling**

Groundwater will be collected from each well using either a portable peristaltic pump equipped with Teflon-lined tubing or disposable bailer, as described in SOP-3.

#### **5.2.4 Surface Water Sampling**

Surface water will be collected from below the water surface using either a portable peristaltic pump equipped with Teflon-lined tubing or direct filling of sample bottles, as described in SOP-4.

#### **5.2.5 Surface Sediment Sampling**

Surface sediment samples (0 to 4 inches) will be collected from the Creek using a stainless-steel shovel, spoon, or trowel following methods described in SOP-5.

#### **5.2.6 Sediment Borings**

Sediment borings will be advanced using a portable, track-mounted, hollow-stem auger drill rig as described in SOP-6. A 2-ft long, 3-inch diameter split spoon will be used (or equivalent) to collect sediment samples at each sediment boring location.

#### **5.2.7 Archeological Site Boundaries**

The boundaries of archaeological sites (shell midden) will be evaluated within Little Squalicum Park following methods described in SOP-7.

### **5.3 SAMPLE IDENTIFICATION**

Sediment/soil samples will be assigned an individual sample identification number in the following manner:

LSP-TP-## - ##

Where: = Little Squalicum Park (LSP)

Sample Type: TP, HA, SB, LSC = Test pit, Hand Auger, Sediment Boring, and Surface Sediment Sample

Sample Location and Depth Interval: ## - ## = top and bottom depth increment in feet

Sediment/soil sample processing will occur at a processing station as described in the following sections. Sample processing methods are intended to result in high-quality samples that meet the program's quality assurance objectives. Guidelines for sampling handling, and storage are presented in Table 5-1. All samples will be placed immediately in a cooler with ice to preserve them at 4°C and will be kept at this temperature at all times. All samples will be labeled and identified in accordance with Section 5.5.

Surface water samples will be assigned an individual sample identification number in the following manner:

LSP-SW-##

Where: Little Squalicum Park (LSP)

SW-## = Surface Water Sample Number

Groundwater samples will be assigned an individual sample identification number in the following manner:

LSP-GW-##

Where: Little Squalicum Park (LSP)

GW-## = Groundwater Sample Number

Field blank samples (i.e., equipment rinsates) will be assigned an individual sample identification number in the following manner:

LSP-FB-##

Where: Little Squalicum Park (LSP)

FB-## = Field Blank Sample Number

## 5.4 SOIL/SEDIMENT PROCESSING

Visual, sheen, and headspace screening will be conducted in the field on all soil and sediment samples collected during this investigation as described in SOP-8.

Compositing will only be performed within individual locations to ensure that adequate soil or sediment is available for the required analyses.<sup>18</sup> Split-spoon samples and test pit soils not used for analysis will be managed in accordance with applicable investigation-derived waste requirements as described in Section 5.8.

Soil/sediment composite samples will be processed according to the following step-by-step procedure:

1. Transfer sediment section from split-spoon or soil from test pit to a clean stainless steel bowl and cover with aluminum foil.
2. Stir the composite sample until the sample is of uniform color and texture. If any material (e.g., shells, rocks) has to be removed from the sample, note it in the field logbook or on the sample description sheet.

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<sup>18</sup> Compositing and homogenizing is not appropriate for the analysis of volatile organics. Discrete samples will be collected only for analysis of volatile organics in soil and sediments.

3. Fill jars for physical, chemical, and biological analyses.
4. Seal each glass container in a plastic bag in case of breakage. Place in ice chest and pack samples to minimize the chances of breaking.
5. Decontaminate the equipment as described in Section 5.7.
6. Collect excess sediment from the composite and dispose of as investigation derived waste, as discussed in Section 5.8.

## **5.5 SAMPLE CONTAINERS AND LABELS**

Guidelines for sample handling and storage are presented in Table 5-1. All samples will be placed immediately in a cooler with ice to preserve them at 4° C and will be kept at this temperature at all times. All samples will be labeled and identified in accordance with Section 5.5.1.

### **5.5.1 Sampling Labels**

The following sections describe documentation with sampling and handling procedures. Details are outlined in SOP-9 in Appendix A.

#### **5.5.1.1 Sample Labels**

Sample containers will be clearly labeled with waterproof black ink at the time of sampling. Sample labels will contain the following information:

- Sample identification numbers
- Sample date
- Sample time
- Preservation used, if any
- Analysis requested
- Initials of samplers.

The sample label will be attached to the sample container prior to, or just after, the container is filled and the lid secured. As an added measure of security, the finished label should be covered with clear packaging tape to protect the ink from moisture and to tightly secure the label to the sample container. Information on the sample label must match the information on the chain-of-custody form and in the site logbook for each sample.

### **5.5.1.2 Custody Seals**

Custody seals will be used on sample shipping containers (coolers) that will either be shipped or sent by messenger to the laboratory. Custody seals will be attached to the lid and body of the coolers to detect any tampering during shipment. The custody seals will be signed and dated by the sampler or sample shipper. Custody seals are not required for samples delivered by hand directly to the lab unless left unattended.

### **5.5.1.3 Sample Summary Log**

Sample summary logs will be maintained by the field team leader and used to keep track of all phases of the sampling and analysis process for all individual samples. The summary sample logs will include sample collection dates, sample delivery dates, dates analytical results are received, laboratory sample delivery group, and laboratory work order number.

### **5.5.1.4 Sample Custody/Tracking Procedures**

The samples collected must be traceable from the time they are collected until they or their derived data are used in the final report. In general, the following provisions apply to sample handling:

- The field team leader, or sampler, will be responsible for the care and custody of the samples collected until they are properly transferred or dispatched to the laboratory.
- All appropriate documentation forms will be used, including sample labels, chain-of-custody forms, sample logs, and any other appropriate forms. Documentation will be completed neatly using waterproof, black ink.
- When transferring possession of samples, the individuals relinquishing and receiving them will sign, date, and note the time on the chain of custody form. Containers shipped by common carrier will have the chain-of-custody form enclosed in a watertight container (e.g., plastic resealable bag) and placed in the container prior to sealing.
- Samples will be packaged properly according to the current U.S. Department of Transportation requirements and promptly dispatched to the laboratory for analysis. Sample containers will be packed in coolers (or other shipping containers) with a low-density packing material, such as bubble wrap, and Blue Ice® or its equivalent. The coolers will be securely sealed.
- Each cooler will be accompanied by its own chain of custody form identifying its contents. A copy of the chain of custody form will be retained by the field team leader for inclusion in project records.

- For coolers shipped via express delivery service, custody seals will be affixed to the outside of the coolers (shipping containers). The field team leader, sampler, or shipper will sign and date the custody seals.
- All samples will be shipped via express delivery for overnight delivery or hand delivered to the laboratory.

## **5.6 FIELD DOCUMENTATION PROCEDURES**

The primary types of documentation that will be used for this project include site logbook, photo logs, sample log forms, Field Change Request (FCR) forms, and sample tracking forms. The site logbooks are vital for documenting all onsite activities. Photo documentation will be used to provide an accurate account of the material sampled, sample locations, and environmental conditions. Sample log forms are used to summarize sampling data collected for various sample locations. The FCR forms are used to document any modifications made to the original project plans during field activities. Sample tracking forms include the chain of custody form, sample labels, and custody seals. The chain-of-custody form is used to track sample custody, which is an important aspect of field investigation activities that documents the proper handling and integrity of the samples. Sample labels are used to provide essential information and identification for all samples collected during field activities. Custody seals are used on all sample shipment containers to detect any tampering that may have occurred during transport or shipment. A description of each of these documentation methods is provided in the following sections. Example field forms are presented in Appendix A.

### **5.6.1 Field Logbooks**

The field logbooks will be used to document all field sampling activities performed at the project site. The logbooks will contain the date, time, and description of all field activities performed; names of personnel; weather conditions; the names of visitors to the site; areas where photographs were taken; and any other data pertinent to the project. The site logbooks will also contain all sample collection and identification information and (if appropriate) a drawing of each area sampled, along with the exact location (coordinates) of where the sample was taken. The sampling information will be transferred to sample log forms when the sampler returns to the site office. The logbook is the official, legal record of site activities, and will serve as the key to sample designations and locations, and will include the date, time, site/sample location, sample identification number, sample matrix, how the sample was collected, any comments, and the sampler's name.

Each page of the field logbook will be numbered, dated, and signed by the author. The logbooks will be sturdy, weatherproof, and bound to prevent the removal of pages. All writing will be done in waterproof, black, permanent ink. No pages may be removed from the site logbooks for any reason. Blank pages, if any, will be marked "page

intentionally left blank.” Any mistakes will be crossed out with a single line, initialed, and dated. If multiple logbooks are used, they will be numbered sequentially.

### **5.6.2 Photo Documentation**

Photographs will be taken at sampling locations and of selected samples. These photos will help identify the location and will provide an accurate visual record of the material being sampled. All photographs taken will be identified in the field logbooks (preferably in a separate section of the book set aside for that purpose). Photographic logs will contain, at a minimum, the film roll number, the photo number, the date, the time, the initials of the photographer, and a description of the image in the photograph.

### **5.6.3 Sample Collection Information Form**

Sampling logs and collection forms will be used to document site and sample characteristic data, which should agree with the information recorded in the site logbooks. Field personnel are required to fill out one sample log form for each sample collected. A copy of these forms will be stored in the field office or field files, with the original stored in the project file. A copy of these forms will also be included in the final data report and other documents, as appropriate. At a minimum, the log for each sample will contain the sample number, the date and time of sample collection, and a description of the sampling site, as well as the physical characteristics of the sample, the planned analysis, and the initials of the sampler.

### **5.6.4 Field Change Request Form**

The field team leader will be responsible for all environmental sampling activities, and will occasionally be required to adjust the field program, to accommodate site-specific needs after consultation with the project manager and/or QA Coordinator. When it becomes necessary to modify a program or task, the changes will be documented on a FCR form. If a field change is later found to be unacceptable, the action taken during the period of deviation will be evaluated to determine the significance of any departure from the established program practices and appropriate action taken. All field changes will be numbered consecutively starting with the number 001.

### **5.6.5 Sample Tracking Forms**

Sample tracking is an important aspect of field investigation activities, as it documents the proper handling and integrity of the samples. Sample tracking forms to be used for the project will include chain-of-custody forms, sample labels, custody seals, and sample summary logs.



### 5.6.6 Chain-of-Custody Form

The chain-of-custody form is used to document the history of each sample and its handling from its collection through all transfers of custody until it reaches the analytical laboratory. Internal laboratory records will document custody of the sample from the time it is received in the lab through its final disposition. The chain-of-custody form will be filled out after the samples have been collected and will be double-checked prior to the transport of the samples to the laboratory. At a minimum, the chain-of-custody form will contain the following information:

- Name of project
- Names of samplers
- Sample identification numbers
- Sampling date
- Sampling time
- Number and type of containers per sample
- Sample matrix
- Sample preservation, if any
- Analysis requested.

The completed chain-of-custody form will be placed in a large capacity Ziploc® bag and secured to the sample transport container. If coolers are used to transport samples, the chain-of-custody form will be taped to the underside of the cooler lid.

## 5.7 DECONTAMINATION PROCEDURES

Equipment decontamination will be performed using procedures outlined below and in SOP-10 (Appendix A). Site personnel will perform decontamination of all equipment prior to removal from the site and between sample locations.

All non-disposable components of the sediment coring equipment (e.g., split spoons), or other equipment used to collect sediment samples that contacts the soils/sediments, will be decontaminated as follows:

- Potable water rinse
- Alconox/Liquinox detergent wash
- Potable water rinse

- Deionized (DI) water rinse
- Air dry.

If non-aqueous phase liquids are encountered in the soils/sediments, the following extra steps may be included in decontaminating equipment:

- Potable water rinse
- Alconox detergent wash
- Methanol to remove water
- Hexane to remove nonaqueous phase liquid (NAPL) film
- DI water rinse.

All sampling equipment that is used in sampling groundwater and surface water will be decontaminated as follows:

- Potable water rinse
- Alconox/Liquinox detergent wash
- Potable water rinse
- DI water rinse
- Air dry.

Rinsate blank samples will be collected as specified in Section 4.6 and SOP-11 (Appendix A) to document the level of decontamination.

All liquids generated as a result of decontamination processes will be containerized and handled as investigation derived wastes, as discussed in Section 5.8.

## **5.8 INVESTIGATION-DERIVED WASTES**

The primary waste streams to be generated during this project and the proposed storage/disposal methods are provided in Table 5-2.

### **5.8.1 Excess/Rejected Sediment Samples**

Sediment/soil samples that are rejected and/or determined to be in excess of what is required to conduct analytical sampling will be returned to the project area that it was collected.

### **5.8.2 Decontamination and Dewatering Wastewaters**

Liquid wastes (i.e., dewatering water and decontamination waters) will be potentially contaminated with petroleum hydrocarbons and PAHs. The presence of any hazardous constituents in the wastewaters is expected to be diluted; therefore, the wastewaters are not expected to be classified as dangerous or hazardous waste. Therefore, the wastewaters are not likely to contain hazardous waste pursuant to the contained-in policy (i.e., environmental media that contain a listed hazardous waste are to be managed as a hazardous waste). Decontamination waters will be disposed of in the project area.

In the use of solvents (e.g., methanol and hexane), decontamination activities will be conducted so as to minimize the potential for spills/releases of wastewaters. Spent decontamination solvents must be stored in leak-proof container(s) with secured lid(s). The lid is to remain closed except when the container is being used for decontamination activities. It is anticipated that liquid wastes be placed in 5-gallon buckets or similar containers for offsite disposal or onsite evaporation (if applicable).

### **5.8.3 Personal Protective Equipment/Miscellaneous Debris**

Personal Protective Equipment (PPE) and miscellaneous debris will be generated during sediment sampling activities. Interim storage of these materials in plastic bags is acceptable. The bags are to be disposed of at an appropriate solid waste facility dumpster after the completion of each sampling event.